HOW WELL DO PERCEPTIONS OF FAMILY PLANNING SERVICE QUALITY CORRESPOND TO OBJECTIVE MEASURES? EVIDENCE FROM TANZANIA

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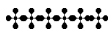

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Abstract

This study examines the objective determinants of *perceptions* of facility quality. The underlying assumption is that perceptions of family planning facilities have the key effects on whether a potential client is a user or non-user of a facility. The data are from two surveys in rural Tanzania. Three models are tested separately for females and males. The important determinants of perceived quality among women and men are: perceived time to the facility, maternal and child health service availability, size of the facility, and type of facility. The data only explain a moderate amount of the variance in the quality measures, indicating that perceived quality is a difficult concept to quantify. Future surveys of facility quality need to include information on perceptions directly linked to objective traits to better determine how to improve perceived quality with the goal of increasing contraceptive use.

HOW WELL DO PERCEPTIONS OF FAMILY PLANNING SERVICE QUALITY CORRESPOND TO OBJECTIVE MEASURES? EVIDENCE FROM TANZANIA

The quality of family planning services is at the center of research and policy interests in the 1990s. The underlying assumption is that high-quality family planning services will help maintain family planning use among initial family planning adopters and will generate new users of family planning (Jain, 1989; Jain and Bruce, 1993; Veney, Magnani, and Gorbach, 1993). The literature on family planning program quality contains two main branches. One branch describes family planning program quality and ways to improve it (Adeokun, 1994; Askew, Mensch, and Adewuyi, 1994; Bertrand, Hardee, Magnani, and Angle, 1995; Brown, Tyane, Bertrand, Lauro, Abou-ouakil, and DeMaria, 1995; Bruce, 1990; Hardee and Gould, 1993; León, Quiroz, and Brazzodoro, 1994). A second, smaller body of research assesses the impact of family planning program quality on family planning use (Beegle, 1994; Jain, 1989; Koenig, Houssain, and Whittaker, 1997; Mensch, Arends-Kuennig, and Jain, 1996; Mroz, Bollen, Speizer, and Mancini, forthcoming). The small number of impact studies may be a consequence of the diversity of descriptive studies that do not have firm approaches to measuring family planning program quality.

Bruce (1990) proposes a valuable framework for assessing quality of family planning services from the client's perspective. The Bruce quality of care framework includes six important elements: choice of methods, information given to clients, technical competence, interpersonal relations, follow-up/continuity mechanisms, and appropriate constellation of services. Descriptive studies based on the Bruce quality of care framework include varying

aspects of facility quality, depending on the availability of information on each element and the unit of analysis.

Recent attention has revolved around whether quality measures should be defined by providers of services or by clients, and how to obtain each of these perspectives (Veney et al., 1993). Bruce's quality of care framework mostly uses client-based measures (client knowledge, satisfaction, health, and family planning use). Because of this, researchers propose the need to assess quality of services based on the clients' perspectives rather than on the providers' perspectives, even when the providers claim to speak for the clients (Veney et al., 1993; Koenig et al., 1997). However, there is also the recognition that clients may be unable to assess certain measures of quality including the degree of competence or the appropriate constellation of services (Koenig et al., 1997).

To date, there have been a number of methodological approaches to obtaining quality of care measures. These include situation analyses, direct observation of interactions between providers and clients, simulated client reports, focus group discussions, and prospective community based studies (Askew et al., 1994; Huntington and Schuler, 1993; Koenig et al., 1997; Phillips, Houssain, Simmons, and Koenig, 1993). Each of these approaches has advantages and disadvantages. For example, situation analyses and direct observations provide in depth information on client-provider interactions and the availability of information furnished to clients. These methods, however, have the disadvantage of providing a small number of observations if few clients visit the facility during the observation period. Also, because the majority of these approaches revolve around a family planning facility, little information is available on the non-clients' perception of facility quality, which may be an important determinant of non-use of family planning.

An additional question for family planning program quality research is whether studies should take place at the individual client level or at the community level. As stated above, studies focusing solely on perceptions of quality as reported by facility clients are unable to obtain quality perceptions for non-users of family planning services (Mensch et al., 1996). Therefore, community level measures of quality and accessibility are often a practical alternative to obtaining information for users and non-users of family planning program services. The usual approaches to obtaining community level measures are to interview a single knowledgeable informant or to record a consensus report from a group of knowledgeable informants. These approaches have been predominately used and studied in the literature on family planning facility accessibility (Chamratrithirong and Kamnuansilpa, 1984; Wilkinson, Abderrahim, and Njogu, 1991). Community level reports of access and quality have the advantage of reducing the amount of missing data obtained in a population based survey where many persons may lack knowledge of the specific facility. The disadvantage, however, is that they provide only one report of a facility characteristic that may vary in the community.

The 1993 Tanzania Accessibility Survey (see Bollen, Speizer, Mroz, and Ngallaba, 1997) had a unique approach to obtaining community level family planning program data. In each rural Tanzanian community, three female and three male knowledgeable informants were interviewed about family planning program access and quality. Interviews were undertaken separately and each individual's report was recorded. This provides six different reports of community characteristics, permitting variation in the measures of access and quality of family planning services.[1]

The few impact studies that have included the client perspective (individual or community) of family planning program quality have found that quality is associated with family planning use.

For example, Koenig et al. (1997) use prospective data from rural Bangladesh to measure quality of care based on women's reports to five questions on interpersonal interactions with female outreach workers. The authors find that women who perceived their interactions to be of high quality were more likely to continue using contraceptives than women who perceived that they received poor care (Koenig et al., 1997). Mensch et al. (1996) use situation analysis in Peru to determine the client perspective of quality. The authors develop a grouped quality measure and find that community level quality of services is associated with contraceptive use, controlling for individual level factors. Unfortunately, this study does not provide a clear demonstration of the effect of the clients' perspective of quality on family planning use because the quality measure used includes numerous objective facility and individual level quality measures grouped together (Mensch et al., 1996).

Similarly, Mroz et al. (forthcoming), using community informants' reports to questions on facility quality in rural Tanzania, find that where the quality is perceived to be better, the level of contraceptive use among women is higher, controlling for individual level factors. The authors demonstrate that among all the program effects (quality, access, distance, and time) included in the model of women's contraceptive use, only perceptions of quality have direct effects on use, controlling for measurement error and endogeneity. While this study demonstrates that perceived facility quality is an important predictor of family planning use, it provides no information on the objective factors associated with better or worse perceptions of facility quality.

Based on the above Tanzanian finding that subjective quality measures are the only program variable associated with family planning use, the current study takes the next step to answer two research questions. What are the facility level objective factors associated with better

or worse perceptions of facility quality? And do the facility level objective traits associated with subjective quality reports differ for men and women?

Methods and Procedures

The Data

Data for this study are from two sources. The first source is the 1993 Tanzania Accessibility Survey (TAS) undertaken as part of the EVALUATION Project of the Carolina Population Center at the University of North Carolina at Chapel Hill (Bollen and Chuwa, 1994). These data were collected during October 1993. For this study, three men and three women from each rural community used in the 1991 Tanzania Demographic and Health Survey were selected based on their knowledge of family planning in the community. Each informant was interviewed separately and asked to report characteristics of a specific facility within 30 kilometers of the center of the community. Generally, the facility discussed was the closest facility, usually a dispensary.

The English translation of the question on quality that we use is: "How would most women (men) describe the quality of [name of facility]?" Responses were on a five point scale where 1 represents very poor quality and 5 represents very good quality. Female and male informant responses on community perceived quality were analyzed separately to allow for the possibility of gender differences in these perceptions. We also used the TAS question on the time it takes to get to the family planning facility: "How long does it take the typical woman of childbearing age to get there by the usual means of transport?" The time measures (in minutes) are logged to reduce the amount of skewness and to lessen the potential effect of outliers.

The second data source for this analysis is the 1994 Tanzania Knowledge Attitudes and Practices (KAP) survey that included a large facility level survey and was undertaken by Macro

International and the Tanzania Bureau of Statistics in collaboration with the EVALUATION Project. This survey was fielded during the months of May and June of 1994. While the dates of the two surveys are not exactly the same, all facilities used for both surveys were open for at least 2 years (most longer) in 1994 when the KAP survey was undertaken. We assume that few of the objective traits varied over the roughly half-year that separates these surveys. When the facilities from the two surveys are matched, a total of 149 rural facilities match in the two surveys. The goal of this study is to examine the determinants of the subjective quality reports from the TAS based on the objective facility level quality traits from the KAP survey.

The Framework and Models

Figure 1 presents the analytical framework used in the analyses of the determinants of perceived facility quality. Two types of influences are depicted: (1) exogenous characteristics of the facilities, and (2) objective mediating influences. Perceived quality of a facility may be related to certain characteristics of the facility that cannot be changed by program improvements. For example, people may assume that hospitals are of better quality than health centers and dispensaries because of the better reputation or other underlying features of hospitals. Likewise, older facilities or facilities that are closer to the community may be better known and thus perceived to be of higher quality. These effects are controlled for in the models that include the direct path from time to the facility, type of facility, and age of facility to perceived quality (paths a and b).

A more likely explanation of the effects of type of facility and age of facility on perceived quality is through the objective mediating influences. That is, a hospital is perceived to be of better quality not simply because it is a hospital, but rather because it has better services to offer, better staff, and greater exposure in the community. To test this hypothesis, we determine

whether the effects of type of facility and age of the facility are mediated by these other objective facility characteristics (paths c and d). The model also assumes that the effect of time is exogenous (path a). In this model, we have no reason to expect that the impact of the time variable is mediated by the other variables, so the model shows only a direct effect on perceived quality.

Our final analysis determines whether, beyond the effect of the measured objective mediating influences, the type of facility and age of facility have direct effects on perceived quality (paths b, c, and d). In this case, there may be other objective unmeasured traits of facilities or some underlying characteristics of facilities that lead to the direct effect of these exogenous variables on perceived quality. Again, the time variable is assumed to have only a direct effect on perceived quality (path a). Each of the models tested was performed separately for females and males to determine if different traits are associated with female perceived quality relative to male perceived quality.

The Variables

Community characteristics of facilities are latent variables that at best we can only imperfectly measure. For example, our outcome of interest, perceived quality, is a subjective concept that varies depending on the person asked. However, there is an overall latent perception of quality in the community that can be determined using the multiple reports of quality in this survey. Though less abstract than quality, even the time it takes to get to the facility contains measurement error as revealed in the differences in the reported times across informants. Our model takes account of the measurement error in both the quality and time variables.

The remaining variables in the model presented in Figure 1 are objective traits of the specific facilities. First, as mentioned above, we include several exogenous variables: type of

facility (hospital, health center, or dispensary)[2], and age of the facility (log of the number of years the facility has existed). Second, a number of objective mediating influences from the 1994 facility level survey are included. These mediating influences generally conform to the Bruce quality of care framework (1990).

The Bruce choice of methods element is measured by the number of family planning methods available at each facility. For this analysis, we focus our attention on the number of modern methods available at facilities including pill, condom, IUD, injections, and foam. This variable ranges from 0-5.

Bruce's technical competence element is measured by three variables. First we include a measure of general technical capacity that measures the number of technical items a facility has (e.g., water, electricity, scales, examination table - up to 30 items). This variable has been logged to adjust for skewness and outliers. Second we include a measure of STD technical capacity: the number of possible tests for STDs available and the availability of a microscope at the facility, coded 0-4. The level of sanitation at the facility is measured by assessing whether a facility uses disposable needles and gloves, whether these materials are ever reused, and whether the materials are in stock.

To measure interpersonal relations, we include an indicator of the size of the facility. We measure facility size as the number of new family planning patients during an average month. Larger facilities are expected to see more patients than are smaller facilities. To control for the skewness of the size variable, we have logged the number of new patients variable. Additionally, to determine whether size has a diminishing returns relation to quality perceptions, we include in the model a squared size term (squared log of number of new patients). Another measure of interpersonal relations included in this analysis is a count of the number of types of staff trained in

family planning provision at the facility. This variable ranges from zero to five to capture training of doctors, rural medial aides, nurses, midwives, and Maternal and Child Health (MCH) aides.[3] We also include in the model an outreach variable that indicates the number of villages or communities regularly visited by the facility's family planning workers. This variable is logged to reduce the skewness in the raw data (raw data ranges from 0 to 182; logged data range from 0 to 5.2).

Appropriate constellation of services is defined by Bruce as situating family planning services within health services, and in our model is measured by determining the availability of MCH services at the facility. A MCH variable is coded 0-4 to account for the availability of antenatal, postnatal, or delivery care, and child growth monitoring. An additional MCH type variable in the model is a measure of the availability of child immunizations at the facility, coded 0-3.

The two Bruce framework components not included in the model are information given to clients and follow-up/continuity mechanisms. No data were available from the 1994 survey to adequately represent the appropriateness of the information offered by providers to clients on the risks and benefits of specific family planning methods. Also, apart from information on outreach and referral statistics, the 1994 survey did not include information on how facilities track and monitor patients who adopt prescription supply methods (e.g., pill or injections). To obtain information on these two elements, a survey would need to (1) interview providers on their interactions with clients (as was done in the 1996 Tanzania Service Availability Survey), (2) obtain in depth information on how records are kept and managed for follow-up, and (3) interview clients on the information provided on each family planning method and whether the importance of follow-up was stressed.

The Statistical Model

We performed the analyses in multiple stages. We used linear regression for preliminary models and structural equation modeling [using Amos (Arbuckle, 1997)] for the final models. Because of the small sample size, a single bootstrap sample was the basis for the preliminary linear regression models and we estimated the final models on the original, raw data. Structural equation techniques are appropriate for these analyses because these methods allow for latent variables (perceived quality and time) and measurement error (Jöreskog, 1973; Bollen, 1989). The structural equation models were fit using a maximum likelihood missing values approach of Arbuckle (1996) permitting the use of all 149 facilities that match in both surveys. (See the appendix for a mathematical description of the models.)

Results

Table 1 includes the means and standard deviations of all variables. Notice that the perceptions of quality (mean values) are similar for males and females and equal to about 3.4 (on a scale of 1-5). Likewise, the male and female time estimates are similar. The majority of the facilities are dispensaries (74%). The next most common type of facility is health centers (18%) and the least common type of facility is hospitals (8%). All but two facilities provide at least one family planning method and more than half provide three or more methods. On the majority of the indices, the facilities in the study are well equipped (e.g., MCH services, availability of immunizations, and level of sanitation). The one exception is on the STD technical capacity where the majority of the facilities (72%) have no laboratory tests or microscope available. The facilities with some STD technical skills tend to be hospitals. There are also high correlations between a facility being a hospital and a facility having greater technical skills, more staff trained in family

planning, and more new family planning patients. These correlations are accounted for in the model that includes the mediating influences between type of facility and facility quality.

Tables 2 and 3 present the results of the three structural equation models for women and men, respectively. Model I contains the results of the model with only the exogenous variables. Model II allows mediating effects between type of facility and age of the facility and facility quality, with no direct effects from the exogenous variables to quality. Finally, Model III is the same as Model II with the direct effects from type of facility and age of facility to the latent quality measure.

We begin by presenting the results for female perceptions of quality (see Table 2) and subsequently present the male results (see Table 3). Interestingly, Table 2 shows that a variable not included in the Bruce framework, time to the facility, has a large, statistically significant influence on female perceptions of quality. Facilities that take longer to get to are perceived to be of lower quality than those that are perceived to be closer, net of the other variables. This raises the possibility that understanding perceived quality of a facility requires that we also look at the perceived time of the journey to get there. The other exogenous variable that has an effect on quality in Model I is type of facility. Women perceive hospitals to be of better quality than dispensaries. No difference is found between health centers and dispensaries. One possible explanation for the hospital effect is that hospitals provide more family planning methods, have more MCH services, or have more staff trained in family planning than dispensaries and health centers. Model II controls for the mediating influences of these facility specific characteristics.

The results in Model II (Table 2) show that as hypothesized in the Bruce quality of care framework, a larger constellation of services, measured as the availability of MCH services, is an important determinant of women's perceptions of facility quality. That is, women perceive

facilities with more MCH services (including antenatal care, delivery care, post-natal care, and child growth monitoring) to be of better quality than facilities with fewer of these MCH services. This was found to be true in both the model without the direct paths from type of facility (Model II) and the model with the direct paths (Model III). Another important facility level variable found to be associated with perceived quality in Models II and III is the size of the facility, measured as the number of new family planning patients in an average month. In these models, there appear to be a curvilinear relationship between the number of new family planning patients and female perceptions of facility quality. Facilities that have more new patients in a month are perceived to be of a better quality, however, once a facility gets too big and has a large number of new patients, the perceived quality declines (the linear term is positive, the squared term is negative). Hospitals are expected to see more new patients in a month. Controlling for the direct effect of type of facility, the size of the facility remains important demonstrating the same curvilinear relationship (Model III).

Based on conventional measures of goodness of fit, these female models have a good fit, with chi-square p-values greater than 0.4. Another aspect of fit is the explained variance in the endogenous variables. The latent quality variable has about 40% of its variance explained by its determinants (R^2 are .389 and .439 in Models II and III, respectively). Though moderate in magnitude, it still leaves a substantial portion of the perceived quality unexplained by the objective characteristics that we included in our model. We can roughly gauge the closeness of the relation between our indicators of quality and the latent variable that they measure by checking the variances in the indicators explained. The moderate R^2 in the equations of the individual quality reports (R^2 is .38) signals that a substantial degree of the indicators' variances are due to error.

Conversely, the models determine the individual time reports well. That is, the latent female time variable and an error term determine the individual time reports with an R^2 of 0.81.

We return to the earlier question of whether all of the effects of age of the facility and the type of facility are mediated by the additional variables that we include. Model II that allows no direct effects of facility type and age of facility is nested in Model III that allows the direct effects of these variables. The chi-square difference between these two models is 4.75 with 3 degrees of freedom. This is a nonsignificant difference, indicating that the model with the direct effects of type of facility and age of facility, controlling for the mediating influences (Model III) does not fit any better than the model that ignores these direct effects (Model II). Therefore, the mediating influences capture the majority of the type of facility effects.[4]

The results of the analyses of male perceived quality are presented in Table 3. For men, like women, an important determinant of the latent quality measure is the time it takes to get to the facility. The longer the perceived time it takes to get to a facility, the worse the quality is perceived to be, perhaps a consequence of unfamiliarity with facilities that are further away. Model I also finds that hospitals are generally thought of as being of better quality than dispensaries. The effect of this hospital variable, however, becomes non-significant in the model that controls for the mediating relationships of facility level characteristics. Models II and III demonstrate that the other important determinant of male quality is the number of MCH services available at the facility. Again, this remains important in the model with the direct path from type of facility to perceived quality. Another variable somewhat associated with male perceived quality is the size of the facility. Facilities with a greater number of new family planning patients are perceived to be of better quality than facilities with fewer new patients. The size effects are more important in the model that controls for type of facility, indicating that size in Model II is not

simply capturing type of facility effects, but has a separate, direct effect on perceived quality, controlling for type of facility.

With chi-square p-values of less than 0.02, the fits of the male models are not as good as they were for the female models. Additionally, the R^2 for the latent male quality variable in Models II and III (.205 and .265, respectively) are smaller than we found for females. Furthermore, the R^2 for the individual male quality report equations is lower than it was for the females as is the R^2 for the individual male time report equations. Finally, the chi-square difference test between Models II and III indicates a nonsignificant difference suggesting that the model without the direct effects from the exogenous variables has as good a fit as the model with these direct effects.

A comparison of the female and male results indicates that while the same variables are associated with male and female quality perceptions (time, MCH services, and size) these variables have greater predictive value for determining latent female quality relative to latent male quality (difference in R^2 values is about 0.17). Notice, however, that even the female models have moderate R^2 values, indicating a substantial amount of unexplained variability in female and male perceptions of facility quality. These results suggest that the objective facility traits that we are measuring are not capturing the full set of variables that drive women's and men's perceptions of facility quality. To better understand perceptions of facility quality, future focus group studies need to assess perceptions of quality and determine which characteristics of facilities women and men use to assess facility quality. This would likely result in new indicators of quality to add to facility surveys.

Predicting Perceived Quality in 1996

The preceding results derive from surveys completed during 1993/1994. The 1996 Tanzanian Service Availability Survey was fielded in October/November of 1996 and is a useful comparison survey for the later date (Bureau of Statistics and the EVALUATION Project, 1997). Unfortunately, subjective community level measures of quality were not obtained in the 1996 survey. However, we use the results of our 1993/1994 analysis and the 1996 TDHS survey to predict the perceived quality levels that would be expected in 1996.

Because the 1996 survey was designed as a follow-up to the 1994 facility level survey (the 1996 survey is more in depth), it is possible to reconstruct the majority of the objective quality measures using the 1996 data. The only two variables that could not be created with the 1996 data were the general technical capacity and the STD technical capacity. The 1996 survey included different question to ascertain these characteristics. Neither of these two variables were significant in our final models of facility quality so they were dropped from the prediction models. To simplify the predictions, we ran the 1994 reduced model (eliminating the above two variables) using simple linear regression techniques, assuming that all variables have direct effects on average female or male facility quality. This model was performed for only those facilities with non-missing data for all variables of interest in 1994 and 1996 (N=115 facilities).

Table 4 presents the means of the indices for the 115 facilities using the 1994 and 1996 data to demonstrate changes in facility characteristics over the two-year period. Type of facility and accessibility remain constant in the two surveys. There is no reason to expect that the time it takes to get to the facilities would change in two years. Comparing columns 3 and 4 in Table 4, we see that small, non-significant improvements in facility services have taken place during the two years. For example, the mean number of family planning methods available has risen from 3.42 to 3.83, and the number of MCH services and the availability of immunizations have also

improved. Non-significant declines were observed in the number of types of staff trained in family planning and the number of villages visited by outreach workers.

Columns 1 and 2 from Table 4 present the ordinary least squares (OLS) results from the 1994 reduced female and male models (eliminating general technical and STD technical capacities). These results are similar to the results from Model III in Tables 2 and 3. Using the OLS regression coefficients from the 1994 data and the 1996 facility data, we predict the expected level of facility quality in 1996. Based on this prediction, the average level of female quality in 1996 would be 3.494. Compare this value to the average female quality in 1994 which is 3.493. Likewise, compare the average level of male quality in 1996, 3.530, to the average male quality in 1994 of 3.307. The differences in average quality over the two-year period are not large, a consequence of the small changes in the facility level characteristics over the two-year period, and the fact that time, an important determinant of perceived quality, is held constant from 1994 to 1996.

Conclusions

This analysis examines the objective facility level traits associated with perceptions of facility quality in rural Tanzania. Our analysis builds on the finding that facilities perceived to be of better quality are associated with greater community level contraceptive use (Mroz et al., forthcoming). The analysis uses the Bruce quality of care elements (1990) to propose possible factors that may be associated with subjective quality. The important characteristics found to be associated with facility quality are time to the facility, MCH availability, size of the facility, and type of facility. These were found to be important for both females and males with the exception that type of facility was not important for males. The results of these analyses demonstrate that perceived

facility quality is a difficult concept to measure, as the individual informant quality reports were only moderately explained by the latent quality measure (R^2 is .380 and .344 for females and males, respectively). This was true for the model determining the objective traits associated with perceived quality as well. For both males and females, the objective traits explain a moderate amount of the variance in the latent quality measures. The models for females do somewhat better than those for males, as demonstrated by the better overall fit and the higher R^2 value for latent female quality in Model III.

One explanation for the greater explained variance and better fit of the female models could be a consequence of the fact that most family planning research has focused solely on women over the last 20 years. Therefore, we have carefully determined factors that may be associated with female perceptions of quality, but have spent less time considering important factors that may affect male quality perceptions. Possibly, the important determinants of quality among men include the number of male staff, the number of family planning, sexually transmitted disease, or AIDS posters with themes that address male concerns, and the number of outreach workers discussing issues important to men. These factors are currently not measured on facility level surveys. Focus group discussions with men may permit a better assessment of the characteristics of facilities that are associated with men considering a facility to be of better or worse quality. This remains to be undertaken on future surveys of the determinants of family planning program quality.

Besides time to the facility, MCH services, and size, the other objective traits used in this study were not found to drive perceptions of facility quality. This may be indicative of the minimal role these factors play in affecting perceptions of facility quality in the Tanzanian context. Contrarily, the other measures (e.g., availability of immunization, staff training, outreach, etc.)

may not be measured well in the 1994 KAP survey and thus we lack adequate explanatory power. With better data (for example using the more in depth data from the 1996 survey) to measure these indices, other objective traits may be found to be associated with the subjective quality measures, and thus a greater amount of the variance explained. Because the quality measures were obtained in 1993, we purposely do not use the 1996 data to determine the relationship between subjective and objective traits. This remains to be done using the 1996 data, with more recently measured subjective quality reports.

In this analysis, we used the 1994 results to predict the level of subjective quality based on the 1996 facility characteristics. We demonstrate that perceptions of facility quality are not expected to have changed greatly during the two-year period. A significant impact of the analysis is the importance of MCH availability on perceptions of quality. If MCH services are improved in the future, it is expected that perceptions of facility quality would improve, and subsequently levels of contraceptive use may rise. By repeating this type of analysis with more in depth MCH data from the 1996 survey and a recent survey of subjective quality, it may be possible to tease out which MCH services will have the greatest impact on perceptions of quality and future levels of contraceptive use.

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Table 1. Summary Statistics of Facility Level Data in 1993 Tanzania Accessibility Survey and the 1994 Tanzania Facility Survey, N=149 facilities with non-missing data on one or more variables

Variable	Mean (SD)	N
Quality		
Average female quality (1-5)	3.51 (.57)	146
Average male quality (1-5)	3.33 (.58)	149
Type of facility		
Dispensary	.74 (.44)	149
Hospital	.08 (.27)	149
Health center	.18 (.39)	149
Age of facility		
LN number of years	3.02 (.60)	137
Methods available		
Number of methods available (0-5)	3.39 (1.11)	140
Accessibility		
Average female time to facility (logged)	3.83 (.99)	147
Average male time to facility (logged)	3.76 (1.00)	149
Technical competencies		
General technical capacity (logged)	2.67 (.29)	143
STD technical capacity (0-4)	.53 (1.02)	144
Level of sanitation (0-6)	2.40 (1.16)	149
MCH availability		
MCH services available (0-4)	3.42 (.86)	146
Availability of immunizations (0-3)	2.57 (.64)	143
Staff training		
Number of types of staff trained in FP (0-5)	1.52 (1.00)	149
Size of facility		
Number of new patients (logged)	2.06 (.99)	141
Number of new patients squared (logged)	5.22 (4.74)	141
Outreach		
Number of villages visited (logged)	1.36 (.81)	146

Table 2. Results of Structural Equation Models of Subjective Female Quality, N=149 Facilities

Variables	**Model 1**	**Model 2**	**Model 3**
Type of facility			
Dispensary (ref)			
Hospital	0.390 (.16)*	NA	0.556 (.31)†
Health center	0.031 (.12)	NA	-0.040 (.13)
Age of facility			
LN number of years	-0.008 (.08)	NA	-0.060 (.08)
Accessibility			
Latent time to facility (logged)	-0.202 (.05)***	-0.218 (.05)***	-0.232 (.05)***
Methods available			
Number of methods available (0-5)		0.009 (.04)	0.002 (.04)
Technical competencies			
General technical capacity (logged)		-0.281 (.22)	-0.312 (.22)
STD technical capacity (0-4)		0.106 (.06)†	0.023 (.08)
Level of sanitation (0-6)		0.017 (.04)	-0.001 (.04)
MCH availability			
MCH services available (0-4)		0.127 (.05)*	0.140 (.06)*
Availability of immunizations (0-3)		0.043 (.08)	0.039 (.08)
Staff training			
Number of types of staff trained in FP (0-5)		0.075 (.05)	0.074 (.05)
Size of facility			
Number of new patients (logged)		0.458 (.14)***	0.558 (.15)***
Number of new patients squared		-0.090 (.03)**	-0.118 (.03)***
Outreach			
Number of villages visited (logged)		-0.066 (.06)	-0.067 (.06)
R^2 Latent Female Quality	**.214**	**.389**	**.439**
R^2 Individual Quality Indicator	.370	.377	.380
R^2 Individual Time Indicator	.809	.809	.809
chi-square (df)	27.17 (32)	86.51 (85)	81.76 (82)
p-value	.710	.434	.487

† p<.10; * p<.05; ** p<.01; ***p<.001

Table 3. Results of Structural Equation Models of Subjective Male Quality, N=149 Facilities

Variables	**Model 1**	**Model 2**	**Model 3**
Type of facility			
Dispensary (ref)			
Hospital	0.336 (.17)*	NA	0.453 (.33)
Health center	-0.104 (.12)	NA	-0.180 (.14)
Age of facility			
LN number of years	-0.007 (.08)	NA	-0.021 (.08)
Accessibility			
Latent time to facility (logged)	-0.138 (.05)**	-0.119 (.05)*	-0.137 (.05)**
Methods available			
Number of methods available (0-5)		-0.008 (.05)	-0.016 (.05)
Technical competencies			
General technical capacity (logged)		-0.020 (.24)	0.026 (.24)
STD technical capacity (0-4)		0.035 (.07)	-0.030 (.09)
Level of sanitation (0-6)		0.024 (.04)	-0.003 (.04)
MCH availability			
MCH services available (0-4)		0.140 (.06)*	0.159 (.06)**
Availability of immunizations (0-3)		-0.020 (.08)	0.037 (.08)
Staff training			
Number of types of staff trained in FP (0-5)		-0.009 (.05)	-0.017 (.06)
Size of facility			
Number of new patients (logged)		0.254 (.15)†	0.359 (.16)*
Number of new patients squared		-0.034 (.03)	-0.063 (.04)†
Outreach			
Number of villages visited (logged)		-0.095 (.06)	-0.091 (.06)
R^2 Latent Male Quality	**.121**	**.205**	**.265**
R^2 Individual Quality Indicator	.345	.343	.344
R^2 Individual Time Indicator	.762	.762	.762
chi-square (df)	44.17 (32)	116.04 (85)	110.57 (82)
p-value	.074	.014	.019

† p<.10; * p<.05; ** p<.01; ***p<.001

Table 4. Ordinary Least Squares Results from 1994 Model of Female and Male Quality for 1996 Predictions. Summary Statistics for Facility Level Data from the 1994 Tanzania Facility Survey and the 1996 Tanzania Service Availability Survey, N=115 facilities with non-missing data

Variable	1994 - Female Coef. (p-value)	1994 - Male Coef. (p-value)	1994 Mean (SD)	1996 Mean (SD)
Type of facility				
Dispensary (ref)			.72 (.45)	.72(.45)
Hospital	.401 (.27)	.216 (.31)	.09 (.28)	.09 (.28)
Health center	-.058 (.14)	-.178 (.15)	.19 (.40)	.19 (.40)
Age of facility				
LN number of years	-.019 (.09)	.049 (.10)	3.06 (.57)	3.17 (.50)
Methods available				
Number of methods available (0-5)	.012 (.05)	.015 (.05)	3.42 (1.13)	3.83 (.85)
Accessibility				
Average female time to facility (logged)	-.253 (.05)***	NA	3.80 (1.02)	3.80 (1.02)
Average male time to facility (logged)	NA	-.131 (.06)*	3.71 (1.03)	3.71 (1.03)
Technical competencies				
Level of sanitation (0-6)	.024 (.05)	.048 (.05)	2.44 (1.13)	2.49 (1.25)
MCH availability				
MCH services available (0-4)	.124 (.07)†	.211 (.08)**	3.48 (.78)	3.82 (.45)
Availability of immunizations (0-3)	.005 (.09)	-.049 (.10)	2.58 (.59)	2.78 (.41)
Staff training				
Number of types of staff trained in FP (0-5)	.114 (.06)†	.037 (.07)	1.62 (.99)	1.19 (1.07)
Size of facility				
Number of new patients (logged)	.579 (.17)***	.405 (.19)*	2.05 (1.03)	2.09 (1.12)
Number of new patients squared (logged)	-.119 (.04)**	-.071 (.04)†	5.26 (5.05)	5.63 (4.91)
Outreach				
Number of villages visited (logged)	-.096 (.07)	-.121 (.08)	1.44 (.80)	1.21 (.85)

† p<.10; *p<.05; **p<.01; ***p<.001

Figure 1

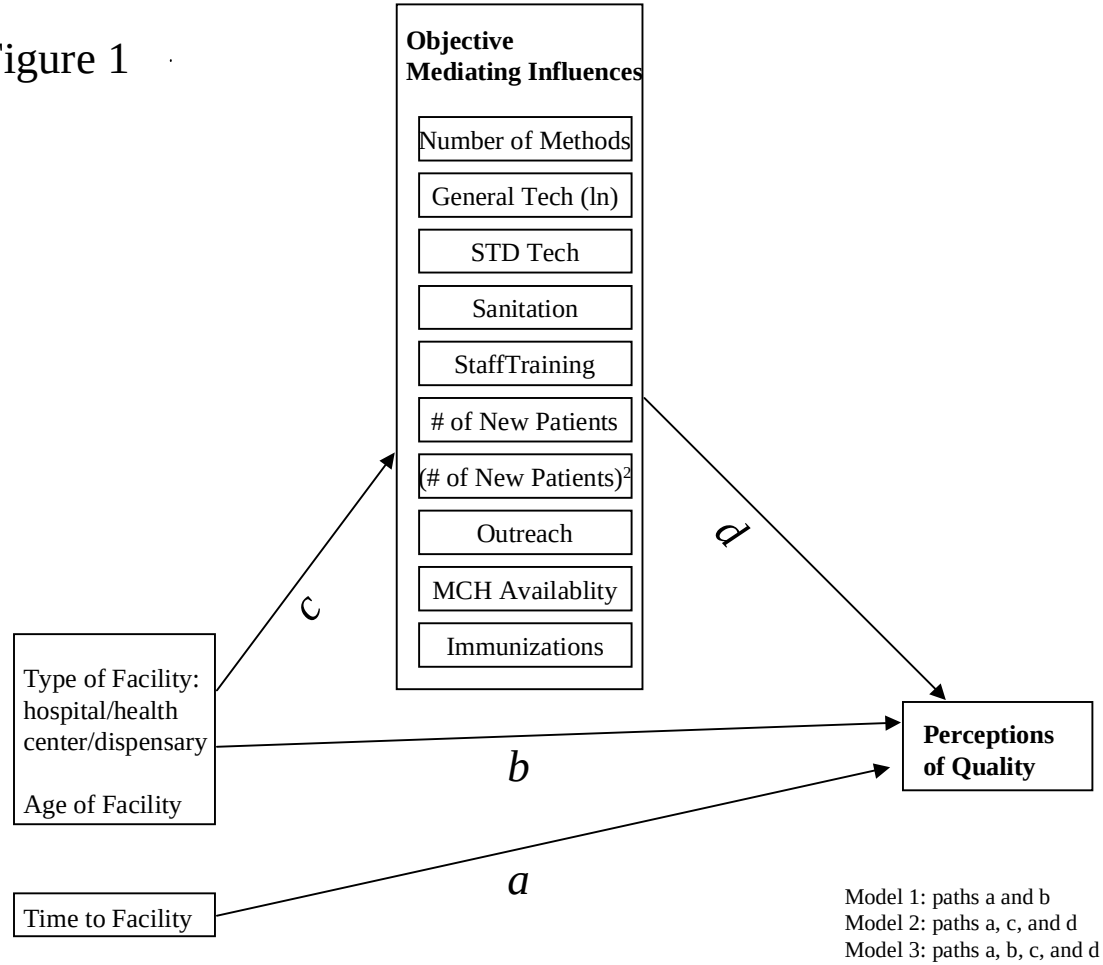
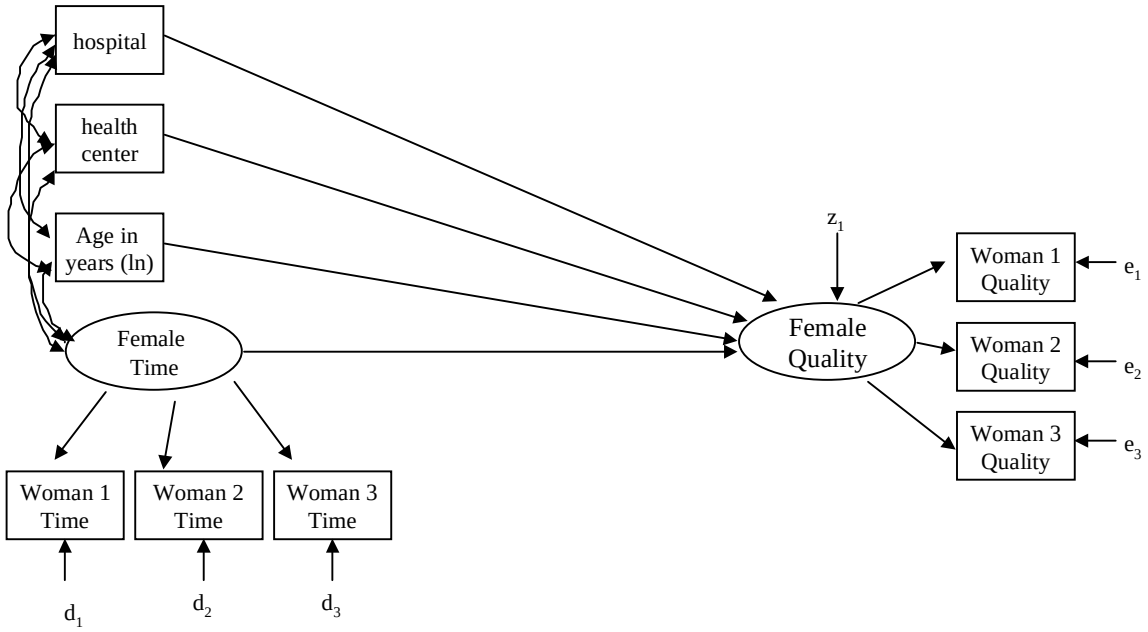

Objective
Mediating Influences
Number of Methods
General Tech (ln)
STD Tech
Sanitation
StaffTraining
# of New Patients
(# of New Patients)2
Outreach
MCH Availablity
Immunizations
Type of Facility: hospital/health center/dispensary
Age of Facility
Time to Facility
Perceptions of Quality
a
b
c
d
Model 1: paths a and b
Model 2: paths a, c, and d
Model 3: paths a, b, c, and d

Figure A.1.


hospital
health center
Age in years (ln)
Female Time
Woman 1 Time
Woman 2 Time
Woman 3 Time
d1
d2
d3
z1
Female Quality
Woman 1 Quality
Woman 2 Quality
Woman 3 Quality
e1
e2
e3

Appendix

The simplest model for this analysis examines the effects of type of facility, age of the facility, and time to the facility on the community perceived quality latent variable. A path diagram of the model is presented below. In the path diagram, the boxes represent observed random variables, the ovals symbolize the random latent variables (quality and time). Single-headed arrows stand for a direct linear effect between the variable at the base of the arrow and the variable at the head of the arrow. Curved two-headed arrows represent that the variables are permitted to freely covary. To scale the latent variables, we set a one-to-one relationship between the latent variable and the observed female reports. Because there is no order expected between the women, we set all paths from the latent measures to the women's reports to one and all intercepts are set to zero. Also, there is no reason to expect different variances in the errors of each woman and these were constrained to be equal. Note, that the time and quality measures in this model are from the same survey. We tested models that permitted covariation between the errors of reports of time and quality from the same woman. None of these covariances was found to be significant and thus the covariances were dropped from the model. The models were all performed for females and males separately. The mathematical model for females is as follows:

$$\text{female quality} = \alpha_1 + \gamma_1 * \text{hospital} + \gamma_2 * \text{health center} + \gamma_3 * \text{age of facility} + \gamma_{1t} * \text{female time} + z_1$$

where: Woman 1 time = female time + d_1 (likewise for woman 2 and woman 3)
Woman 1 quality = female quality + e_1 (likewise for woman 2 and woman 3)

The second model introduces mediating explanatory variables through which health center, hospital, and age of facility might have their effects. These mediating variables derive from the Bruce quality of care elements that we described previously. The equations for this model are as follows:

$$(\text{Objective mediating influence})_j = \alpha_{2j} + \gamma_{1j} * \text{hospital} + \gamma_{2j} * \text{health center} + \gamma_{3j} * \text{age of facility} + \varepsilon_j$$

where j = 1 to 10 representing the ten mediating influences, and

$$\text{female quality} = \alpha_3 + \gamma_{2t} * \text{female time} + \beta_{1j} * (\text{objective mediating influence})_j + z_2$$

Finally, the third model is similar to the second model with the addition of a direct path from type of facility and age of facility to perceived quality. The only change is in the quality equation such that:

$$\text{female quality} = \alpha_4 + \gamma_{41} * \text{hospital} + \gamma_{42} * \text{health center} + \gamma_{43} * \text{age of facility} + \gamma_{3t} * \text{female time} +$$

Notes

1. An important caveat of using community level program variables in individual level models of family planning use, however, is that the program effects tend to be attenuated since family planning adoption is an individual level rather than a community level decision (Mensch et al., 1996).

2. Dispensary is the reference category.

3. Note that dispensaries and health centers were not asked about doctors so are limited to a 0-4 range.

4. Notice, however, that the R^2 in the latent quality equation rises when the model includes the direct effects of type of facility. Though we are surprised that it does increase, the significance test suggests that the difference between the model with and without the direct effects have essentially the same fit.